

CALIFORNIA ENERGY COMMISSION

CHARLES R. IMBRECHT
Chairman



April 14, 1989

Carl P. Gertz, Project Manager
Yucca Mountain Project Office
U.S. Department of Energy
Box 98518
Las Vegas, Nevada 89193-8518

Dear Mr. Gertz:

The State of California, through the California Energy Commission, appreciates the opportunity to comment on the Final Site Characterization Plan for the proposed High-Level Nuclear Waste Repository located at Yucca Mountain, Nevada. State agencies included in this review include the State Water Resources Control Board, the California Department of Fish and Game, the California Department of Conservation's Division of Mines and Geology, the California Department of Water Resources, and the California Parks and Recreation. Our comments focus on the adequacy of the Site Characterization Plan for developing information relevant to potential impacts to California.

The most important geologic issue relevant to California is potential groundwater contamination resulting from an accidental radionuclide release at the site. Preliminary site characterization studies conclude that Death Valley is hydraulically connected to, and down-gradient of, the aquifer beneath the Yucca Mountain site. The potential for migration of radionuclide contaminants into eastern California aquifers (i.e., into the Death Valley regional groundwater basin), therefore, is of concern as are potential impacts on water supplies for California fish and wildlife populations in and near the Death Valley National Monument.

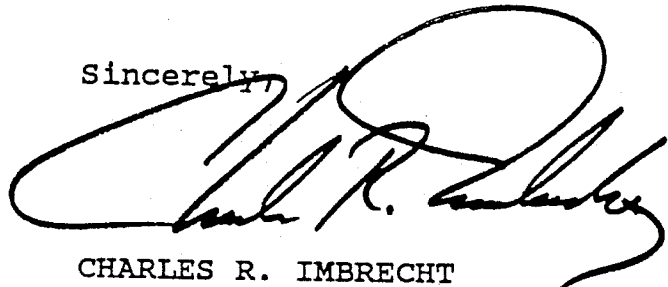
In order to determine whether potential impacts within California might occur, the Site Characterization Plan (SCP) should include complete regional, as well as local, aquifer characterization. Emphasis should be placed on adequately qualifying and quantifying potential aquifer contamination down-gradient of the site. Future studies should concentrate on developing an accurate local and regional hydrogeologic model, with consideration of factors of the hydrogeologic regime that are dynamic over the post-closure time frame. In addition, the SCP should include provisions to assess potential effects on fish and wildlife populations dependent on potentially affected groundwater supplies, if contamination is a realistic concern.

Mr. Carl Gertz
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We request that the State's Division of Mines and Geology be notified in advance of any studies, for example geologic/seismic studies, to be conducted in California as part of the Yucca Mountain Repository Site investigation. California has geologic information which may prove to be useful to the federal government's investigation of the Yucca Site. In turn, geologic studies conducted within the state as part of the site characterization program would be of value to the state.

Our more detailed comments are attached. Any questions regarding these comments may be directed to Barbara Byron (916/324-3273) or Daniel Nix (916/324-3167).

Sincerely,

A large, stylized handwritten signature in black ink, appearing to read 'Charles R. Imbrecht', is written over the word 'Sincerely,'.

CHARLES R. IMBRECHT
California Energy Commission


Enclosure

State of California

Memorandum

To : Barbara Byron
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Date : MAR 29 1989



Jesse M. Diaz, Chief
Division of Water Quality

From : STATE WATER RESOURCES CONTROL BOARD

Subject : REVIEW OF SITE CHARACTERIZATION PLAN OVERVIEW FOR PROPOSED
HIGH-LEVEL NUCLEAR WASTE REPOSITORY LOCATED AT YUCCA MOUNTAIN,
NEVADA

We appreciate the opportunity to review the Overview of the Site Characterization Plan for the proposed high-level nuclear waste repository located near Yucca Mountain, Nevada. Staffs general comments on the proposed facility follows. (Note: Headings do not follow sections in Overview, but rather are general areas of concern.):

LOCATION

Not all figures show the repository location. Each figure should depict this location. Without this information, it is difficult to place the Repository in relation to the natural and man-made features which have been discussed throughout the Overview. Staff was not able to ascertain the relative location for the exploratory shafts to be dug in relation to the proposed Repository. It is difficult to determine if the location for this testing is close enough to the proposed Repository site to test the same depositional environment, but far enough to prevent creating a potential conduit for ground water into this same Repository. We would be happy to complete the evaluation when the figures are amended.

SEISMICITY

The Overview states "Measurements made since 1978 show that within about six miles from the proposed repository the release of seismic energy has been 100 or 1,000 times lower than that in the surrounding region". This statement is not clear as to its intent. It may be that the site is storing up energy (locked fault segment) which indicates increased probability of relatively large fault movement in the future.

The prediction of future seismicity has only been presented in general terms. The theory of eduction (Dixon, Farrar, 1979) should be discussed in terms of predicting future seismicity. This paper states that the upwelling and lateral flow of mantle material associated with the subducted East Pacific Rise produced the horizontal extension of the Basin and Range Province. This scenario may indeed describe the mechanism which created the Yucca Mountain area. In this case, the seismicity expected may be different than that proposed previously for Basin and Range geographic provinces.

VOLCANISM

Hydrothermal veining due to nearby volcanism may have been the cause for calcite-silica-sepiolite veining seen in the area. Thus, their presence may indicate the existence of a volcanic body at depth near this site. The potential for future volcanism and the associated ground water rise upwards through new veins needs to be defined in terms of their effect upon the Repository. The origin of these calcite-silica-sepiolite deposits should be examined.

LITHOLOGY

The Overview discusses the welded tuff, the rock type into which the Repository may be installed. However, much of the investigation to date, as well as future investigation of this lithologic bed, must rely upon the use of geophysics predominantly so as not to disturb the in-place material at the Repository site. However, it is difficult to characterize welded tuff deposits by the use of geophysics due to the fact that welded tuffs are dense and have no definitive structure and because of the complexity and heterogeneity of the site. Thus, the exploratory shafts will need to serve, by the use of direct sampling, to extrapolate and infer the distinguishing characteristics of the rock materials at the proposed Repository site. As discussed under LOCATION, staff has not been able to determine where these exploratory shafts will be dug, nor were they able to find in the report the rationale as to why the exploratory shaft site is similar geologically to the proposed Repository site. It is not clear in the report if the investigators are planning to drill these exploratory shafts in the same lithologic bed as the proposed Repository. Since much data must be derived from these exploratory shafts to aid in the understanding of the rock material at the proposed Repository site, it is important that staff understands the rationale for their placement. We would be happy to complete the evaluation when the information is submitted.

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MINERAL RESOURCES

The report states that no high temperature geothermal resource exists in the area. The report considers 190 degrees Fahrenheit to be the minimum temperature for a high temperature resource, although the actual temperature at which electricity can be produced (albeit inefficiently) may be below this temperature. Because the report does not quantify the surrounding heat flow gradient anomalies, the potential for geothermal development in the future is unknown. Also, with the probable future advent of new technologies, as well as dwindling energy supplies, a fairly low heat flow gradient may be indicative of future energy reserves. Investigation of these reserves at a later date may result in future disturbance of the Repository site.

In the Overview, the designation "speculative, undiscovered" was applied to gold, silver, mercury, uranium, and base metals occurring in the area of the facility. These terms should be defined. No indication was given in the report as to whether further exploration for these minerals would be performed. If there is some potential for these minerals to exist at the proposed Repository site, then it should be determined whether they do indeed exist at the site.

HYDROLOGY

A full description of the ground water below the proposed Repository was not included in the Overview. This description should include water quality analyses (Chloride, Iron, Manganese, Sodium, Phenols, Sulfate, pH, specific conductance, total organic carbon, total organic halogens, gross alpha, gross beta, total gamma, radionuclides), yield, and storage coefficient.

No age dating information on the ground water has been supplied. The age of this water would give an approximation of surrounding lateral and vertical permeabilities as well as recharge and discharge rates and locations.

It is not clear as to whether the underlying aquifer is confined or unconfined, which would help to indicate potential flow paths and discharge points, such as the Furnace Creek area of Death Valley National Monument.

The estimates of rainfall infiltration given in the report are 0.3 percent. It is not clear if pan evaporation rates were used. If so, then slow, steady precipitation events should be factored into the calculations to determine actual infiltration.

It has not been described how flow direction was determined under the site nor whether further delineation of the flow regime will be performed during site investigation and

Repository construction. There must be a site-specific investigation undertaken to determine these flows, as regional studies alone do not yield enough information to determine this information accurately.

It is not clear as to why such a large discrepancy exists between the predicted migration rates (9,000 to 80,000 years) through the bedrock to the saturated zone given in the Overview document. All permeability values determined from below the level of the Repository should be determined relative to the suspected leachate that would be produced from the waste.

The investigation at the area of the exploratory shafts indicates that sampling of the unsaturated zone will be performed when possible. However, it is not stated how sampling will be performed. It would seem reasonable to install lysimeters to collect this water for continuous monitoring rather than or in addition to a one-time sampling.

The Overview document states that pump tests will be conducted in the saturated zone to determine hydrologic parameters. It is not clear which type of well pump tests will be performed nor how long these tests or the infiltration tests will be performed. Slug tests can be used in conjunction with pump tests in the saturated zone to give a larger number of data points. Packer tests should also be used in the unsaturated zone to determine subsurface permeabilities. No boreholes drilled for the determination of hydrologic parameters should have drilling fluids introduced downhole. In many cases, air can be used for the purpose of lifting the cuttings (and for cleaning blast holes). If fluids must be introduced, they should be kept at a minimum and the resultant mud cake scraped from the walls of the borehole.

No mention is made of water quality or quantity sampling of Ghost Dance fault nor of the imbricate faults identified on Figures 2 and 3. Test holes should be drilled, fluids sampled, and aquifer tests performed in these areas to further identify local hydraulic characteristics. These faulted areas would seem to be capable of carrying the most fluids subsurface.

The presence of much faulting in the area (32 faults of unknown activities within 6 km, Dudley, USGS, GEOTIMES, January 1989) increases the permeabilities and porosities of the natural geologic materials. This secondary permeability and porosity precludes the predictability of the variable porosities and permeabilities of the Repository site. The Overview states that investigators believe fracture flow to be a minor component of flow in the area. The rationale for believing that fracture flow is minor compared to matrix flow should be explained.

GEOENGINEERING

No mention is made in the report of the methodology for sealing boreholes, shafts, or ramps after abandonment. Normal methods of sealing (as used today in the drilling industry) are not suitable for long-term isolation. The water content of the seals (grouts) will lessen over time and the grout mixture will crack, especially with the added heat that radioactive decay within the Repository will produce. Unless a better method of sealing is agreed upon, it might be better to rely upon diversion instead of, or in conjunction with, sealing. This would require the placement of diversionary dams and/or checks at various subsurface locations to divert flow from these boreholes. They must be designed to compensate for an elevated water table if this area experiences a wetter climate in the future.

The surface expression of these boreholes would require the same types of devices to stop the introduction of fluids below ground. All of the openings sealed after closure of the site should also have a method of diversion designed accordingly.

Roof bolts, such as those proposed to be used to stabilize the roof of the Repository, can not be expected to remain in-place for 10,000 years. The excavation of the Repository should make use of the surrounding consolidated tuff formation to insure long-term stability in the Repository gallery. By proper design and excavation of the gallery, it may be possible to distribute the loads upon existing, in-place bedrock, as either pillars or by utilizing the surrounding enclosure itself. This would be a more realistic alternative as the usefulness of roof bolts diminishes greatly over a relatively short period of time (depending on ambient conditions).

The Overview document states that waste-emplacement boreholes will be only partially lined and grouted in the effort to contain waste within the boreholes. All vertical and horizontal waste-emplacement boreholes should be fully lined and grouted to prevent, to the greatest possible extent, migration of fluids either into or out of the holes.

Air gaps between the waste-emplacement cylinders and the borehole walls have been designed to keep ground water away from the waste-emplacement cylinders. The air gaps will not have adequate capacity if ground water encroaches upon the facility. Thus, these air gaps should not be relied upon to demonstrate isolation of the wastes from saturated or unsaturated underground flow.

MAR 29 1989

Barbara Byron

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A number of drains are to be installed in the Repository (exact number is unknown). All drains are likely to clog over time. A procedure should be developed to test for clogging and a design implemented to allow for remediation should clogging occur.

The term "lithophysae" is used in conjunction with the thermal and mechanical response of rocks within the Repository. Staff have not been able to find a definition for "lithophysae" and are thus unable to determine the accuracy of the investigation of the breakout room.

It is not clear for what length of time this repository is designed to retard the flow of radionuclides. Staff assumes the report is referring to complete containment for 300 years and partial containment for 10,000 years. If this assumption is correct, partial containment should be defined.

As our concerns and questions are addressed, the State Water Resources Control Board would be happy to make further comments on the Site Characterization Plan. Thank you again for the opportunity to comment on the proposed nuclear waste repository. If you have any questions, please telephone Bill Levine, of my staff, at (916) 322-0203 (ATSS 492-0203).

cc: O.R. Butterfield
Executive Officer
California Regional Water Quality
Control Board, Lahontan Region
2092 Lake Tahoe Blvd.
P.O. Box 9428
South Lake Tahoe, CA 95731-2428

California Regional Water Quality
Control Board, Lahontan Region
15371 Bonanza Road
Victorville, CA 92392-2492

Memorandum

To : Barbara Byron
California Energy Commission

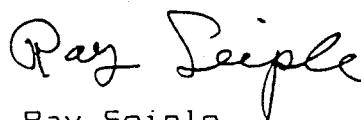
Date : March 27, 1989

From : Ray Seiple
Advisory Services Officer
Department of Conservation
Division of Mines and Geology
630 Bercut Drive, Sacramento 95814

Subject: Comments on the Yucca Mountain Site Characterization Plan (SCP).

Attached are comments on the SCP prepared by Jeffrey K. Howard of the Environmental Protection Program. I am submitting these comments as the Department's designated representative on the Interagency Task Force on High-level Nuclear Waste.

We have commented on six (6) specific areas of the SCP: groundwater, volcanic hazards and hydrogeologic conceptual models, paleoclimatic effects, seismic hazards, cooperation in geological and seismological studies and waste transportation route. Any future investigations to finalize the site's environmental characteristics should be designed to provide the necessary data, or satisfy the recommendations, suggested in these six areas.



Ray Seiple
Advisory Services Officer

RS:tml

cc: H. Sarasohn
J. Ziony
J. Howard

Memorandum

To : W. Ray Seiple
Advisory Services Officer
Division of Mines and Geology

Date : March 27, 1989

From : Jeffrey Howard, Environmental Protection Program
Department of Conservation
Division of Mines and Geology
630 Bercut Drive, Sacramento 95814

Subject: Proposed Yucca Mountain Nuclear Waste Repository
Memorandum of Review of Final Site Characterization Plan Overview

Preface

The Environmental Protection Program of the Division of Mines and Geology (DMG) has reviewed the Site Characterization Plan (SCP) Overview for the proposed Yucca Mountain High-Level Nuclear Waste Repository. Comments, presented below, are directed toward potential issues relevant to the State of California. Issues within the State's purview involve potential contamination of eastern California groundwater by radionuclide waste migrating from the proposed waste site. Issues specific to the Yucca Mountain site may be indirectly relevant to California if they involve the repository's ability to contain the waste.

Due to the brief time available to DMG's Environmental Protection Program for the SCP review, the comments below are limited to the SCP Overview. We submit the following:

General

The SCP is not intended to provide a final description of the site's environmental characteristics. At this time, many site parameters, which are critical to the final site selection process, need verification. The purpose of the SCP is to summarize 1) the relevant data currently assembled from preliminary studies, 2) the definite conclusions which can be drawn from the data, 3) the significant questions which remain or have surfaced, and 4) the proposals for further investigation. To this end, the SCP should address the range of possible interpretations of the data, and the program of future study necessary to produce and verify an accurate final site characterization.

The determination of appropriate future studies should proceed as the results of current studies are developed. DMG recommends that the Department of Energy (DOE) inform all interested and qualified agencies of the Site Characterization progress, and solicit feedback from interested agencies on a regular basis.

Groundwater

The most important geologic issue relevant to California is groundwater contamination. The potential for migration of radionuclide contaminants into eastern California aquifers (i.e., into the Death Valley regional groundwater basin) is a legitimate concern. Preliminary site studies conclude that Death Valley is hydraulically connected to, and down-gradient of, the aquifer beneath the Yucca Mountain site (Waddell et al., 1984).

DMG defers to the California Water Resources Control Board, or other governing agencies dealing with groundwater quality, on more precise comments regarding 1) specific aspects of aquifer characterization, 2) the potential for contaminant release at the site, 3) the potential for subsequent migration into eastern California, and 4) the adequacy of the SCP in addressing those issues.

The premise for all contamination issues is the potential for accidental radionuclide release at the site. It may be impossible to absolutely assure that radionuclide release will not occur over the 10,000 year post-closure period. Therefore, future site studies should include complete regional, as well as local, aquifer characterization, with emphasis on qualifying and quantifying the potential aquifer characteristics down-gradient of the site.

Investigation techniques and practices should be carefully planned to produce reliable data, while avoiding degradation of desirable aquifer characteristics. For example, exploratory boreholes and shafts should be designed to prevent radionuclide migration in otherwise low permeability (desirable) materials. Since boreholes may act as connections between the site and the underlying aquifer, their location, depth, drilling method, testing method, and closure should be carefully planned and conducted. Furthermore, final site characterization should evaluate the impact, over the post-closure time frame, of the total subsurface exploration conducted on the site.

The SCP Overview describes the site's hydrogeologic regime in terms of a relatively simple conceptual model, assuming steady-state conditions similar to those which exist today (p.26-30). Future studies outlined in the Overview (p.104-107) emphasize refinement of the knowledge of existing hydrogeologic characteristics of the "saturated" and "unsaturated" zones underlying the site, to develop precise models to predict the conditions that would be expected over the post-closure period. Important aspects of the hydrogeologic regime include the relative importance of liquid and gas flow through rock fractures and the rock matrix.

A revised conceptual hydrogeologic model, incorporating "dynamic" processes, has been proposed (Szymanski, 1987). This model suggests that significant, periodic changes occur in the hydrogeologic environment, which could increase the potential for the escape of radionuclide contaminants into the surrounding environment. Future studies should concentrate on developing an accurate local and regional hydrogeologic model, with consideration of factors of the hydrogeologic regime that are dynamic over the post-closure time frame. These studies should have a high priority, as the conditions predicted by the alternative conceptual model may result in the disqualification of the Yucca Mountain site (Szymanski, 1987). This model is further discussed below.

Volcanic Hazards and Hydrogeologic Conceptual Models:

Szymanski's (1987) alternative conceptual model applies to the hydrogeologic regime of the Yucca Mountain subbasin, and to the greater Death Valley groundwater basin, of which the subbasin is a part. This conceptual model incorporates a "two phase, heat-field coupled, flow field developed in a deforming fractured medium". It is dynamic, in the sense that it allows for "evolutionary loops" in the hydrogeologic regime resulting from deformational cycles in the region. In this model, the characteristics, and relative importance, of rock matrix and fracture flow could change significantly.

The dynamic model incorporates post-closure regional geologic/tectonic factors more comprehensively than the existing (steady-state) conceptual model. Therefore, the "dynamic" model would seem appropriate for site characterization over the post-closure period.

The significant deformational cycles may be associated with episodes of volcanic activity nearby. The current knowledge about the age and character of a) the adjacent Crater Flat volcanic field, and b) local faulting, together with the history of past caldera formation in the area, suggest that future periodic volcanic activity and regional deformation episodes can be expected. The SCP should evaluate the association of deformational cycles and volcanic episodes, with emphasis on the timing and character of both such episodes. The possibility of renewed local volcanic activity during the post-closure period, and the resulting possible impacts to local hydrogeologic conditions should be fully addressed. Other studies should address the effects of heat and water chemistry induced by such volcanism on the repository performance.

Szymanski (1987) suggested a study, among others, that would compare interstitial and fracture porewater at the site to test the validity of his conceptual model. Such a test may or may not prove conclusive. The comparison apparently would assume that the effects of the most recent deformational episode were not overprinted by a past wetter climatic cycle. Whether a wet

climatic cycle, such as the last (Wisconsinian) ice-age, could have overprinted the hydrogeologic effects of a cyclic deformational event should be ascertained. The potential for climatic overprinting becomes more substantial if the timing of the last significant deformational cycle pre-dates the end of the Wisconsinian ice-age.

Paleoclimatic Effects

Paleoclimatic factors are crucial to the assessment of the repository site over the post-closure time frame.

The SCP Overview indicates that the proposed Yucca Mountain Repository Site has existed in an arid to semi-arid climate during the Quaternary period (p.31). To put that in perspective, most of the Central Valley in California has a semi-arid climate. The combination of cumulative precipitation and evaporation determines the aridity. Obviously, long-term changes in temperature, as well as precipitation, are important factors. However, additional factors need to be considered for a hydrogeologic evaluation. For example, the amount of groundwater originating from adjacent geographical regions may be significant, and should be evaluated. Groundwater from outside sources may include runoff from nearby mountainous watersheds, percolation from neighboring aquifers, and surface flows originating from wetter regions.

Long-term climatic change is an important consideration for site hydrogeologic characterization over the post-closure period. The response of the groundwater elevation to changes in climatological factors would depend to a large degree on the relative importance of fracture vs. matrix (interstitial granular) flow and permeability. Appropriate investigations and monitoring should be conducted to address potential climatic change factors, and resulting aquifer response. In addition, potential changes in local and regional aquifer characteristics (permeabilities, flow paths, etc.), resulting from groundwater elevation adjustments, should be fully evaluated.

Seismic Hazards

Seismic hazards in the vicinity of the proposed Yucca Mountain Repository Site are of concern to California, given that such hazards could release radionuclides to the environment.

The SCP Overview describes numerous normal faults at, or in the vicinity of, the site. According to the Overview, the Ghost Dance fault crosses the repository area and has a significant amount of vertical offset. Although the Ghost-Dance fault is not identified as having evidence of Quaternary-age movement, other similar faults nearby display such evidence (SCP Overview, p.22). Apparently, all of these faults formed in response to the same tectonic environment. Therefore, the Ghost Dance fault should be assumed to be potentially active until evidence can be produced that precludes its activity.

The SCP Overview states that "geologic field evidence suggests that in terms of major tectonic activity Yucca Mountain has been relatively stable for the past 11 million years" (p.22). However, the Overview should clarify this statement with respect to the activity of specific site faults. Faults with a potentially active status should be included in assessments of rupture and strong motion hazards.

The SCP Overview states that estimated seismic strong ground motion for the preliminary design of the proposed facility is 0.4g, based on a M6.8 event on the Bare Mountain fault, 11 miles away (p. 22). While this estimate seems conservative for the pre-closure time frame, the context in which it is given suggests that deterministic methods were used in its derivation. A probabilistic assessment is a more appropriate method for estimating the design-basis strong ground motion. A probabilistic analysis would consider the potential size and number of events from all seismic sources in the vicinity, and the uncertainty of strong motion estimation, given an assumed level of risk. The Overview should clarify whether their strong motion estimate is derived by probabilistic or deterministic methods, and whether it, or some other value, applies to the post-closure time frame. If probabilistic seismic hazard methods are utilized, the Overview should describe the assumptions and input parameters assumed in the ground motion assessment.

The SCP should also fully address disturbance associated with strong ground motion from continued nuclear weapon detonations at the Nevada Test Site.

Cooperation in Geological and Seismological Studies

DMG is interested in any geological/seismological studies conducted in California that the U.S. Geological Survey, the Department of Energy, or any other agency involved with site characterization studies may perform in conjunction with further evaluation of the Yucca Mountain site. The U.S.G.S. has proposed seismic refraction exploration, as part of the Yucca Mountain Repository Site studies, in Death Valley National Monument. Furthermore, other California regions may provide useful analogies to test conceptual models of groundwater flow behavior theorized for the site and its vicinity. Such information may prove to have scientific and economic importance outside the realm of the site selection, and, therefore, be valuable to the State. DMG would like to be informed of planning for geologic and seismologic investigations planned in California, and would appreciate the opportunity to provide input for such studies. The information exchanged could be useful and valuable to all concerned.

Waste Transportation Routes

Potential slope mass-movement hazards, such as rockslides and avalanches, may be significant along nuclear waste transportation routes in California as well as Nevada. Slope raveling, erosion, sedimentation, flooding, and other geologic factors, may temporarily close routes and necessitate continual route maintenance. These problematic factors could limit the timing of waste transportation opportunities, or require temporary alternate routing, which are not in the best interest of waste transportation operations. Route selection will depend heavily on security factors. None the less, DMG encourages the consideration of geologic hazards and problematic conditions in transportation route selection.

Closing

Questions on any of the above comments may be referred to Jeffrey Howard of the Division of Mines and Geology's Environmental Protection Program. He can be reached at (916) 323-4399.

References

- Waddell, R.K., Robison, J.H., and Blankennagel, R.K., 1984, Hydrology of Yucca Mountain and vicinity, Nevada-California -- Investigative results through mid-1983; U.S. Geological Survey, Water Resources Investigation Report 84-4267.
- Szymanski, J.S., 1987, Conceptual considerations of the Death Valley groundwater system with special emphasis on the adequacy of this system to accommodate the high-level nuclear waste repository; U.S. Department of Energy, Nevada Operations Office, Waste Management Project Office, Las Vegas, Nevada, November.

Memorandum

To : Ms. Barbara Byron
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Date : March 23, 1989

From : Department of Fish and Game

Subject : U. S. Department of Energy - Yucca Mountain Site Characterization Plan

The Department of Fish and Game has reviewed the U. S. Department of Energy's Site Characterization Plan (SCP) for the proposed Yucca Mountain, Nevada, high-level nuclear waste repository. The SCP describes the detailed studies that will be performed to determine the suitability of the site for nuclear waste disposal, and the potential environmental impacts of construction and operation of the repository. The Department is interested in the SCP because of potential impacts the waste repository could have on water supplies for California fish and wildlife populations in and near Death Valley National Monument.

The Death Valley area is one of the most arid regions in North America. Perennial water supplies in the region are available only where groundwater surfaces in springs or short reaches of streams. Many fish and wildlife species are totally dependent on the unique habitats that these isolated water supplies provide. Some of these species occur nowhere else on earth. The Department is particularly interested in the following species:

Amargosa pupfish
Saratoga Springs pupfish
Salt Creek pupfish
Cottonball Marsh pupfish
Shoshone pupfish
Amargosa vole
Saratoga Springs Belostoman bug

Cyprinodon nevadensis amargosae
Cyprinodon nevadensis nevadensis
Cyprinodon nevadensis salinus
Cyprinodon salinus milleri
Cyprinodon nevadensis shoshone
Microtus californicus scirpensis
Belostoma saratoga

In addition, two as yet unclassified forms of Amargosa speckled lace (Rhinichthys osculus ssp.) occur in the area, and some endemic snail species have recently been discovered in the area as well. Of these species, the Amargosa vole is both State- and Federally-listed as endangered, and the Cottonball Marsh pupfish is listed by the State as threatened. Other species may well qualify for listing in the future, when more is known about them.

Ms. Barbara Byron

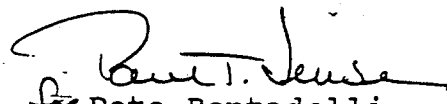
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March 23, 1989

Because these species are totally dependent on surfacing groundwater, the Department is concerned about any effects the waste repository may have on groundwater flows and groundwater supplies. The SCP indicates that the groundwater that supplies the springs and streams in California originates from recharge areas in Nevada. These groundwaters flow underground, past the Yucca Mountain disposal site, and then to California in a slow, complicated underground path that the SCP indicates is not well understood. If the construction or operation of the waste repository interrupts or depletes these groundwater flows, water supplies for the many fish and wildlife species listed above, and other plant and animal species as well, could be reduced or cut off. Because some of these species occur nowhere else on earth, this could cause the extinction of several fish and wildlife species.

The Department believes that the U. S. Department of Energy should perform the necessary studies to determine if the project will reduce or cut off groundwater flows to California. The Department notes that the SCP describes several planned studies that relate to groundwater. However, the SCP does not include a study element specifically aimed at addressing potential project effects on fish and wildlife populations dependent on groundwater supplies. The Department recommends that such a study element be added to the SCP as a separate and significant part of the overall study plan. Furthermore, the Department recommends that if this study determines that impacts on California's fish and wildlife populations could occur, the U. S. Department of Energy should implement alternative project features or modifications, or develop adequate mitigation measures, so that these impacts do not occur.

Thank you for this opportunity to comment on the SCP. If you have any questions about the Department's comments, please contact Pete Phillips at (916) 322-4891.


Pete Bontadelli
Director

